A.D. 1822 . . . . Nº 4664.

Printing.

CHURCH'S SPECIFICATION.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, William Church, of Nelson Square, in the County of Surrey, Gentleman, send greeting.

WHEREAS His most Excellent Majesty King George the Fourth did, by His Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date at Westminster, the Twenty-first day of March, One thousand eight hundred and twenty-two, in the third year of His reign, give and grant unto me, the said William Church, my ex̃ors, adm̃ors, and assigns, His especial licence, full power, sole privilege and authority, that I, the said William Church, my ex̃ors, adm̃ors, and assigns, during the term of years therein mentioned, should and lawfully might make, use, exercise, and vend, within England, Wales, and the Town of Berwick-upon Tweed, and also in all His Majesty's Colonies and Plantations abroad, my Invention of "An Improved Apparatus for Printing;" in which said Letters Patent there is contained a proviso, that if I, the said William Church, shall not particularly describe and ascertain the nature of my said Invention, and in what manner the same is to be performed, by an instrument in writing under my hand and seal, and cause the same to be inrolled in His Majesty's High Court of Chancery within six calendar months next and immediately after the date of the said Letters Patent, that then the said Letters Patent, and all liberties and advantages whatsoever thereby granted, shall utterly cease, determine, and become void, as in and by the same (relation being thereunto had) will more fully and at large appear.

NOW KNOW YE, that in compliance with the said proviso, I, the said William Church, do hereby declare that the nature of my said Invention, and

the manner in which the same is to be performed, are particularly described and ascertained in and by the Drawings hereunto annexed, and the following description thereof (that is to say) :—

My improved apparatus for printing consists of three parts ; first, a machine for casting the printing types, and also of arranging them in boxes of letters, so that the types of the same denomination are placed side by side in ranges, ready to be transferred to the composing machinery. The second part of the apparatus consists of a machine, by which the individual types are selected and composed into words and sentences. The third part of the apparatus is a press for printing and delivering the sheets into a pile.

Fig. 1 of the Drawings is an horizontal view of the type-founding machine ; Fig. 2 is a front elevation, the fly wheel and part of the frame being removed ; Fig. 3 is a section of the machine, cut through the middle from front to back ; the respective letters referring to the same parts of the machine in each of the three first Figures.

A is a close metal chest, an elongated box or trough, which extends across the machine, for the purpose of holding the fluid metal ready to be run into the type mould ; B is the type mould, several detached views of which are shewn at Figs. 4, 5, 6, 7, 8, 9, and 10. *a, a, a,* are grooves in the mould bar, seen particularly in Fig. 4, which are intended to form the body of the letter ; *b, b, b,* are the matrices, which are placed in a groove in the matrix bar C ; D is the fountain, filled with fluid metal, which supplies the metal chest. In this fountain a float is placed for the purpose of acting as a valve (see Fig. 8), in order to stop the metal from returning to the melting pot through the tube E, by which it is supplied ; this float also prevents the metal from flowing too fast into the fountain, for when the metal has occupied the fountain to a certain height, then the entrance pipe becomes closed ; this height is regulated by the screw cock Z. The chest A being furnished with fluid metal, a plunger F is forced into it, which, by displacing a portion of the metal contained in the recess Y of the chest A, drives it with considerable force through the jets *i* into the moulds. This part of the operation, however, will be more fully explained in describing the movements of the machine. G is a fly wheel, to be turned by hand, which gives motion to the shaft H ; upon this shaft the cam wheel I is affixed, and consequently turns with the fly wheel and shaft in the direction of the arrow ; an elevated cam *c* (see Fig. 2) upon the periphery of the wheel I is stationed under the friction roller at the end of the long lever J, before the machine begins to act, by which the plunger F is held up. As soon as the wheel has revolved sufficiently to slide the cam *c* from under the

friction roller of the lever J, the plunger F is instantly drawn down by the weight K, which is attached to it, and in its descent, injects the fluid metal into the type mould, as above described, by which the types are cast. When the wheel I has revolved some distance further, an enlarged part of the periphery *d* comes in contact with the friction roller at the end of the lever L, and raises it; at the reversed end of the shaft which carries L is a shorter lever L*, which by means of a connection formed between the short lever L* and the tye mould B, shifts the mould bar endways, for the purpose of cutting off the communication of the moulds with the fluid metal, and also to bring the moulds under the punches. In this stage of the operation, it becomes necessary to unlock the matrix bar C; this is done by the further progress of the wheel I, which brings the cam *e*, fixed on the inside of the wheel I, in contact with the friction roller of the lever M, and shifts the lever sideways, which causes the bar N (attached to the reverse end of this lever) to be so far shifted laterally as to unlock or withdraw the wedges *f*, *f*, *f*, formed upon the bar, from the sockets or slots of the loops *g*, *g*, *g*, which hold the matrices in contact with the moulds. By this means the matrix bar is allowed to descend about the eighth of an inch, so as to withdraw the matrices from the cast types. The matrix bar C is now to be drawn forward from under the types, in order to clear the way for their descent into the boxes, where they are arranged. This is effected by means of the cam *h*, which, in the further advance of the wheel I, strikes against the friction roller at the upper end of the lever O, and causes the reverse end of that lever to draw forward the matrix bar by its connecting piece P, the sectional construction of which is shewn in Fig. 3. The next operation is that of discharging the types from the mould; this is done by the cam *k* coming in contact with the friction roller of the lever Q; this lever is connected by its axle to the lever R, hence they both move together. By the movement of Q, the lever R forces down the punch bar S connected to it by a link *m*, from the under side of which bar the clearing punches *l*, *l*, *l*, *l*, protrude; this bar is guided by the slider T passing through the upper part of the frame. By the descent of the punches *l* into the grooves *a* of the mould bar B, the types are projected downwards, and descend into the guides *n*, which guides are twisted one quarter round, in order to bring the bodies of the types into a proper position, so as to arrange themselves side by side, in the same manner as when placed together in a line by a compositor. The cam *k* having passed the friction roller of the lever Q, the weight V descends and raises the lever R, which lifts the punches *l* out of the mould to their former place. The cam *o* now comes in contact with the friction roller at the lower end of the lever O, and pushes it back, which causes the connecting piece P to drive back the matrix

bar C to its former situation; the middle of the connecting piece P is formed into a spring bow *j*, for the purpose of more perfectly adjusting the matrices to the moulds. In order to regulate this adjustment, two screws *p*, *p*, are passed through the matrix bar, the ends of which screws strike against the stopping pieces *q*, *q*, attached to the mould bar. The locking up of the matrix bar is now to be effected by the cam *r* coming in contact with the inside of the friction roller of the lever M, which pushes it back again, and drives the wedges *f*, *f*, up into the slots of the loops *g*, *g*. The next motion of the mechanism is the sliding of the mould bar back into its former situation, which is done by the friction roller of the lever L (as the wheel I passes round) descending from the enlarged part of the periphery of the wheel I at *s* to the lesser part of the periphery of the wheel I, which lever L, connected with the short lever L*, as before described, is pulled down by the weight, and shifts the mould bar back to its former place. The wheel I, having performed one entire revolution, brings the cam *c* again under the friction roller of the lever J, which raises the plunger, and another operation of casting at this point commences. After the types have descended in the guides *n*, they are pushed backward into the ranges of the box *u*, *u*, by means of the guide cams V, V, fixed upon the axle H of the fly wheel G; a friction roller at the end of the lever W acts between these cams, as shewn in the Drawing, Fig. 3; and, here, by the revolution of the axle and cams, the lever W is caused to vibrate, which slides the bar X, connected to the punch projector bar *u*, backward and forward, and thus, at every operation, forces the punches *v* through the guides *n*, and drive the types, one after the other, in their erect position into the ranges of the box *u*.

As the construction of the mould bar is an important feature in this Invention, I shall now describe its parts, independant of its connection with the machine. In Fig. 4 the mould bar B is shewn with the punches over it and the twisted guides below, formed between two plates of brass; the steel pieces numbered 1 and 2 in the section, Fig. 3, which forms the ink edge of the types, being removed in order to display the grooves or recesses *a* in which the body of the types are cast. These peices are shewn fixed on in the detached view of the mould bar, Fig. 7, where the mouths of the moulds are shewn. Fig. 5 is a section of the mould bar B, taken lengthways in the direction of the dotted line in 3, 4, in Fig. 3, which shews the water passage carried along the bar, for the purpose of keeping the mould cool. This passage is supplied with a current of water from a cistern through the pipe Z, and discharged at the other end of the mould bar through the pipe &. Fig. 6 is a horizontal section of the mould bar and metal chest, cut through the jets, in which a section of the water passage is seen, and also nicks in the edge of the long slip

of steel forming the jets, for the purpose of allowing the types to be pushed out of the moulds when they are brought under the punches. Fig. 8 shews the metal chest A, and its connection with the fountain. The jets *i* are formed in a long slip of steel fixed into the side of the metal chest (seen also at *i* in Fig. 3). W is a flanch on the top of the metal chest, through which the hooks *x*, *x*, pass for the purpose of attaching it to the mould bar; F is the plunger before described; D is a section of the fountain filled with fluid metal, with the float, as above mentioned; Z is the screw cock, through which the metal passes from the melting pot. The upper part of this screw cock may be encompassed by a cup for the purpose of holding water to prevent the cock from becoming soldered tight into its socket. A similar cup may also be used at the top of the plunger cylinder F for the same purpose. *y* is the channel for drawing off the fluid metal that may remain in the metal chest when the casting is to be discontinued, which metal must be drawn off through the discharge cock at bottom of the fountain. It may not at all times be necessary to employ the cam wheels and levers by which the various operations of casting are effected, in the manner before shewn; I sometimes employ the type mould and metal chest, as in Fig. 9, a horizontal view, in which the metal chest is shewn in section, and the face plate of the mould bar turned up; also in Fig. 10, which is a section cut across the centre. In these Figures, A is the metal chest; B is the mould bar; C is the matrix bar; D is the face plate turned up; E, E, are two wires for forming the nicks in the types; F is the plunger; G, a handle to draw back the moulds. The chest being filled with fluid metal in the manner before described (though the fountain is not here shewn), I press down the plunger F by a lever intended to be acted upon by the foot, by which a quantity of metal is forced through the jets *i* into the moulds *a*. The types being thus cast, I raise the face plate D, and draw back the mould by means of the handle G, the joints *c*, *c*, enabling me to lift the mould over the break *d*, and draw it until the plate *b* has reached the break *d*, which is then stopped in its progress by the nut *e* coming in contact with bar *f*. By pulling the handle a short distance further, the the types held by the necks or grates of metal in the plate *b* are drawn out of the mould, when, by depressing the handle G, the types are lodged in the notches *g* of the break *d*. Now, a lateral motion of the break *d*, produced by the handle I, cuts off the types from the necks or grates, and they fall down into a receiver below. The necks or grates of metal are now to be forced out of the holes in the plate *b*, which is effected by means of a comb or range of small punches applied by hand. The bar being slidden back again is placed in the situation for a second operation. As the type are pushed

forward in the ranges they pass under the straight edge X*, Fig. 3, and are cut or trimmed to a uniform length, the height of which cutter is regulated by the screw Y*.

The second part of my apparatus for printing consists of a machine by which I compose the types, that is, collect the respective letters and associate them together into words and sentences. Having disposed and arranged the several types into narrow boxes or slips, each individual slip containing a great number of types of the same letters, which I call files of letter, I place the case of these types in the upper part of my composing machine, different views of which are shewn in Figures 11, 12, 13, and 14. Fig. 11 is a front view of the machine in complete working order; Fig. 12 is a section of the same, cut through it perpendicularly; Fig. 13 is a representation of the machine, taken sideways or at the left end; and Fig. 14 is a view of the back part of the machine; the respective letters referring to the same parts of the mechanism in every Figure. A, A, are the boxes or slips containing the types or files of letter; B, B, are a number of jacks, to each of which a key is connected in a manner somewhat similar to the jacks and keys of an harpischord; C, C, C, C, are four rows of these keys, which are so disposed for the sake of gaining space, in order that any one of them may be conveniently touched by the finger; D is a plate, shewn detached at Fig. 15, with a number of slits corresponding to the number of jacks, in which slits the heads of the jacks slide; there are precisely the same number of jacks that there are boxes or files of letter, each file being exactly over a slit in the plate D, with the heads of the jacks standing up through the plate, and raising behind the files, each something less than the thickness of the type it is designed to act upon. The section, Fig. 12, will best elucidate the following description :—Any one of the keys being pressed upon by the finger *a* will, by its descent, cause the upper part of the jack *b* to advance and push forward the undermost type of the file it is intended to act upon. By the descent of the key the bar *c* is forced down, which depresses the arms *d*, *d*, and raises the lever *f*. The bar *c*, with its arms *d*, *d*, axle *e*, and lever *f*, is shewn detached at Fig. 16. *g* is a barrel containing a helical spring intended to act as a clock movement in order to give motion to the train of wheels and rods above; *h* is a toothed wheel upon the barrel, taking into a pinion *i*, upon the axle of which pinion is another toothed wheel *j* taking into a pinion *k*, which train of wheels and pinions is intended to give a great velocity to the axle of the last-mentioned pinion. Upon the axle of *k* a snail wheel *l* is fixed, which is shewn detached at Fig. 17; in the face of this snail wheel *l*, a spiral groove is cut for the end of the lever *f* to act in, the revolution of the snail brings the point of the lever *f* down to that part of

the groove which is nearest to the periphery, whence its progress is stopped by the notch or angular turn of the groove *m*; this is the situation of the snail when the keys are at rest. On striking any one of the keys the bar *c* is depressed, as above said, and the lever *f* raised up through the knotch *m* into the smaller radius of the spiral groove; the clock movement is now set at liberty, and the snail carried once round, stopping as before said by knotch *m* striking against the end of the lever *f*; a crank *n* is formed in the axle of *k*, to which the connecting rod *o* is coupled. The intention and action of this part of the mechanism will be best seen in the back view, Fig. 14. As the crank *n* goes round, the connecting rod *o* will raise and depress the lever *p* to which it is connected by an adjustable box and screw. From the extremities of the last-mentioned lever *p* two rods *q*, *q*, rise up to the top lever *r*, which is fixed upon an axle *s*, seen best in the section, Fig. 12. At the front part of this axle the arm *t* is affixed, which stands nearly at a right angle with the lever *r*; the front view, Fig. 11, will shew the action of this arm *t* upon another similar axle *v*. To the left of the former is affixed a corresponding arm *u*, the action of both which arms are connected together by the cross rods *w*. Returning to the axle *k*, Fig. 14, it will be seen that by one revolution of the crank *n* the ends of the levers *p* and *r* are made to vibrate, which will produce a pendulous stroke of the arms *t* and *u*, Fig. 11. To the lower ends of these arms small rods *x*, *x*, are attached, which being connected to the collectors *y*, *y*, (shewn detached in several positions at Fig. 18,) at every vibration of the arms, carry them toward the middle of the race *z*, Fig. 15, and back again. It will now be necessary to revert to the situation of the type which has been pushed forward by the jack *b* into the race *z*, and is there seen at *a**, Fig. 12, and in dots in Fig. 11. The collectors in advancing bring the type from whatever part of the race it may happen to be situate into the centre under the beak of the lever *c**, at which instant of time the snail *l* raises the rod *b**, which lifts the back part of the lever *c**, and causes the type placed under its beak to be pushed down the aperture *d** into the curved channel *e**, which answers the purpose of a composing stick. In beginning the operation it will be necessary to place a small spring slider to prevent the type from falling irregularly down the channel, In this composing stick the types accumulate and are progressively collected into words and sentences, from whence they may be taken and adjusted into lines by hand, or collected into pages by means of a box which may be placed on the side of the machine at the end of *e**. In order to preserve the position of the type, and guide it steadily along the race, a light bar of steel *f**, *f**, Figs. 11, 12, and 13, is placed in the race, which rises or falls according to the progress of the mechanism. The action of this will be

best seen in the end view, Fig. 13. The bar f^* is here shewn resting upon the type; as in the foregoing description, the type is considered to be pushed forward by the jack ready to be sliden along the race; as the arms *d, d*, raise, the rods g^* are carried up, which lifts the bent levers h^* and the lip j^* at the lower end of the bent levers, raise the bar, and deposits it in the notch of the catches i^*, where it remains until by the depression of another key the rod g^* pulls down the bent lever h^*, the head of which lever, forcing back the catch, lets the bar fall upon the type, as above described. In order to keep the clock-work in action, it will be necessary to wind up the spring of the barrel *g*, which is done by means of a pedal with a cord passing over the pulley g^*, which pulley is fixed upon the arbour of the barrel, and is furnished with a ratchet wheel and palls.

The third part of my apparatus is a printing press, a side view of which is seen at Fig. 19, and the ends at Fig. 20 and 21; a section is shewn at Fig. 22, and a plan or horizontal view, Fig. 23; the respective letters referring to the same parts in these five Figures. *a* is the table to receive the form of types; *b* is the platten, supported by the standards and framework; *c, c*, are the side rails; *d, d*, is the inking frame and rollers; and *e, e*, are the friskets. The press is put in motion in the following manner:—The fly wheel *f* is made to revolve by the handle in the direction of the arrow first, for the purpose of passing the inking rollers over the types. Upon the axle of the fly wheel are pulleys *g* and *h*, to each of which a cord *y* and *z* is attached; these cords are also connected to the pulley *i* in opposite directions, and by the revolution of the fly wheel produces an alternating revolution of this pulley. The mode by which this is effected will be best seen by reference to the section, Fig. 24, (a detached representation of part of the fly wheel and cam wheel axle.) With the axle *l* of the fly wheel, a sliding endless screw *m* with a cross thread revolves, and is made to travel in a lateral direction to and fro by means of a swivel tooth *n*. The inner part of this endless screw is chambered out, leaving an internal flange at each end; the pulleys *g* and *h* are also chambered out; and as the endless screw *m* travels towards the pullies, a sliding glut *o*, inserted in a groove in the axle, is pushed by the flange 1 of the endless screw coming in contact with the tooth *w*, and hence forcing it out of the chamber of the pulley *g* into that of the pulley *h*, by which *h* becomes locked into the action of the revolving axle *l*, winding the cord *z* round it; at the same time the pulley *g* is out of geer, and is drawn round in an opposite direction by bringing the flange 2 in contact with the tooth *w* of the glut *o*, draws it out of the chamber *h*, into that of *g*, and locks *g* into the action of the fly-wheel shaft, by which the cord *y* is now coiled round the pulley *g*, and the cord *z* uncoiled

from the pulley *h*; *j* is an enlarged part of the pulley *i*, Figs. 21 and 22, to which a cord is attached, and coiled several times round it, from whence it extends to the other end of the frame, and passes over another pulley *k*, and back again to the pulley *j*, to which the end is connected, as shewn in the section. This cord is fastened to the carriage of the inking rollers, and as the pulley *i* revolves, causes the inking roller and carriage to travel backwards and forwards over the types and distributing tables; *p*, *p*, are two rollers connected by a broad band, the width of which is equal to the length of the rollers; *q* is the ductor; as the carriage advances, it strikes a lever *r*, and by a pall and ratchet turns the ductor rollers *p*, *p*, by which a small quantity of ink is brought to the upper side of the band; this lever is pulled back again by its weighted arm *s*. As the hindermost inking roller passes over the broad band, it takes up a portion of ink, which it deposits upon the distributing boards *t*, *t*; upon the axle of the fly wheel another cross-threaded endless screw *v* is fixed, and revolves with it; into the thread of this screw a swivel tooth is inserted, which is connected by an arm *u* to the distributing table *l*, and hence causes the table to travel alternately in a latteral direction as the rollers pass over it; these tables are supported each upon three sliding pins; the rollers, having passed over the distributing table, now roll upon the form of type and inks them. In this stage of the operation the frisket *e* 1 is to be carried under the platten *b*, which is effected as follows:—Fig. 17 is an enlarged representation of the side rail, as shewn in Fig. 14. The roller carriage *d* having proceeded nearly across the form, by means of a catch *w* locks with the slider *x*, and carries it forward. Attached to this slider is a cord, which passes over a pulley a, upon the same arbour as the pullies *i* and *j*, and thence proceeds to the other end of the rail, when it is coiled round and attached to the smaller periphery of an accelerating pully b; a similar cord is coiled round the small part of the pully b in the opposite direction, and connected to the other end of the slider *x*; a cord, attached and coiled round the larger periphery of the accelerating pully *b* is connected with the end of the frisket *e* 1, and hence it will be seen, that by the further progress of the roller frame *d* and slider *x*, the frisket *e* 1 will be quickly brought between the table and platten ready to receive the impression. The next operation is the raising of the table for the purpose of giving the impression. The table is supported by two bars c and d, jointed together at e; it is guided on its ascent and descent by two cylindrical sliders f, f, with work in sockets g, g, and is balanced upon the lever h, by the loggerhead i. The operation of raising the table is effected by the revolution of the cam wheel acting against a tappet at the joint e; the mode by which the revolution of the fly wheel and axle is connected

to the shaft of the cam will be seen as follows:—In Fig. 16, the union of the fly-wheel shalft and cam shaft are shewn; the fly-wheel shaft is continually revolving, but the cam-wheel shaft is only occasionally locked into action with it. This is done by the revolution of the endless screw, which is continually locked to the fly-wheel shaft by means of a glut k fixed upon it, and which occupies a notch in flange 2 of the endless screw *m*. When the endless screw has travelled sufficiently far to reach the tooth 1, a notch in the flange 1 slips on to this tooth, and thus locks the cam shaft and the fly-wheel shaft together; in this situation of the shafts the cam wheel is brought into action, and which, by revolving, drives the bars c, d, towards a perpendicular direction, and the tappet m against the tappet at the joint e, by which effort of straightening the joint, the table is raised and the impression given. By the further rotation of the cam wheel the bars c, d, fall back to their former position, and the table descends. In order to take off the sheet after it is printed, one of the chaps of a pair of broad nippers is introduced under the edge of the paper in the following manner:—The wheels *n*, *n*, Figures 19, 20, 21, and 22, are made to revolve by means of cords O, O, coiled round them, and connecting their action. These cords carry the said nippers, which are worked in the following manner:—Fig. 26 is an enlarged representation of the opposite side rail to Fig. 25, shewing also the wheels *n*, *n*, which carry the nippers. The roller carriage d having passed the centre of the table in the direction of the arrow, causes the catch *a* to strike against the pin *c* of the slider *v*, by which the slider is carried forward; a cord connected to the slider at *e* passes over the pulley *f*, and back again to the pully *g*, round it, and under the pully *h* to the pully *i*, where it is coiled round and attached; by this line cording the advance of the roller frame brings the nippers from where they last discharged the sheet at *k*, to their situation between the table and platten a *l*, where they are about to take hold of the next sheet; by the closing of the table, the nippers are pressed together, and thus embrace the edge of the paper. At this time the catch *a*, passing over the weighted lever *m*, liberates the slider *b* on the return of the roller frame. After the sheet has been printed, the catch *a* takes hold of the pin *n*, and carries the slide *b* back again; to the other end of the slider a cord is attached, which passes over the pully *p*, and along the rail to the pully *g*, over this, and under the pully *r* to the pully *s*, where it is coiled round and attached. Thus by the return of the inking frame, the nippers holding the sheet of paper are carried from *l* over the periphery of the wheel *n*, *l*, and along the top rail to *l*, the nippers being guided by the ends of their axles *v* and *u*, sliding in the groove W; during this time the frisket which brought the sheet under the platen is carried back to its former

situation. Fig. 27 is a representation of the double nippers, which are made to open by their inclined planes coming in contact with swinging tappets as *x* and *y*, Fig. 26, which tappets are capable of being moved upon the rail for the purpose of adjustment to different sized sheets of paper. By the further progress of the inking frame, which carries the slider *e*, these nippers are made to travel from *t* where they quitted the sheet to *z*, ready to take up the next sheet, which has been brought in under the plate by the slider *z* in the same manner as the slider *x* carried in the former sheet. For the purpose of procuring a correct register, I attach register points to the frisket in a manner similar to that by which they are attached to the tympan of an ordinary press. These register points pass with the frisket under the platen, the points upwards; and attached to the tympan are corresponding point springs, with holes to receive the points, by which means the paper is pierced. In order to secure a perfect coincidence of register, I attach to the frisket pieces of a wedge form, which are intended to drop into corresponding recesses in the platen or the table, by which it will be seen that when the frisket has arrived within a short distance of its place upon the table, the slipping of the wedge pieces into the recesses enables it to adjust itself with perfect accuracy; or instead of this method, I sometimes place a stopping piece upon the table or platen, or other convenient part against which the frisket strikes, and is held closely by the elasticity of the cords. In order to prevent accident from the press closing before the pressman has placed his sheet properly upon the frisket, I have contrived a mode by which the press throws itself out of geer; this operation will be seen by reference to Fig. 28, which represents a perpendicular edge view of the fly wheel; its shaft and ratchet *a*, attached to the axle; *b* is a rod, pendant from a joint *c*, and attached to the side of the rail; *d* is a small bar, connected by a hinge to the rod, and passing through a mortice in the side of the rail. At the lower end of the rod *b* a ring *e* is attached, which encompasses the axle; on the roller carriage is a tappet, which, as it passes, strikes against the inclined end of the bar *d*, and pushes it out endways, by which the rod *b* is forced out of the perpendicular, as shewn by dots, and the ring *e*, being pressed against the lever *f*, raises its longer arm out of the ratchet, and thus puts the fly wheel out of geer with its shaft. Another modification of my printing press is shewn at Fig. 28, in which the pressure is given by drawing the platen down, instead of forcing the table up; *a* is a fly wheel, turned by a handle, which gives motion to an axle *b*; *c* is a stud pinion upon the fly-wheel shaft, from which a chain passes round the stud wheel *d*, and which wheel is carried round by the revolution of the fly wheel communicated to it. With the axle of this last-mentioned stud wheel

a cam e turns, which acts against the weighted arm of the balance lever f, which is similar in form to the balance lever described in my patent printing press of 1821. The cam e revolves in the direction of the arrow, and its elongated part, pressing against the friction roller f, carries up the weighted end of the balance lever and depresses the reverse end, by which the connection rods g pulls down the platen and gives the impression; on the other side of the press is a similar rod g, connected to the lever f and platen h; by the further revolution of the cam e, which is constantly turning, the weighted arm of the balance lever descends, and raises the platen into its former position. The mode of bringing forward the inking rollers and other parts of the operation are effected exactly in the same manner as described in the above Figures.

In order that the form of types may be more conveniently placed on the table, I slide the platen b from over the table, as is shewn in Fig. 23. After the form of types have been used and the desired number of impressions taken therefrom, instead of distributing them in the ordinary manner, I recast them, as above described.

In witness whereof, I, the said William Church, have hereunto set my hand and seal, this Twenty-first day of September, in the year of our Lord One thousand eight hundred and twenty-two.

WILLIAM (L.S.) CHURCH.

AND BE IT REMEMBERED, that on the Twenty-first day of September, in the year of our Lord 1822, the aforesaid William Church came before our said Lord the King in His Chancery, and acknowledged the Specification aforesaid, and all and every thing therein contained and specified, in form above written. And also the Specification aforesaid was stamped according to the tenor of the Statute made for that purpose.

CROSS.

Inrolled the Twenty-first day of September, in the year of our Lord One thousand eight hundred and twenty-two.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1857.